

**DETAILED ACTION**

***Response to Amendment***

1. The amendment filed by Applicant on August 23, 2011 has been fully considered.

The amendment to instant claims 6 and 15 to correct minor informalities is acknowledged.

All previous rejections are maintained for the reasons set forth in the "Response to Arguments" section below. The following action is made final.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**2. Claims 6, 8, 13-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Li et al** (US 5,760,097).

3. The rejection is adequately set forth on pages 2-6 of an Office Action mailed on February 23, 2011 and is incorporated here by reference.

**4. Claims 6, 8, 11-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Li et al** (US 5,760,097) in view of **Hird et al** (US 2005/0091450), **Ko et al** (US 2003/0134918) as evidenced by **Cawiezel et al** (US 5,633,220).

5. The rejection is adequately set forth on pages 6-8 of an Office Action mailed on February 23, 2011 and is incorporated here by reference.

**6. Claims 14-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Li et al** (US 5,760,097) in view of **Sasabe et al** (US 2003/0036575), as evidenced by Lenntech/deionized water flyer.

7. The rejection is adequately set forth on pages 9-10 of an Office Action mailed on February 23, 2011 and is incorporated here by reference.

**8. Claims 14-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Li et al** (US 5,760,097) in view of **Hird et al** (US 2005/0091450), **Ko et al** (US 2003/0134918) and **Sasabe et al** (US 2003/0036575), as evidenced by **Cawiezel et al** (US 5,633,220) and Lenntech/deionized water flyer.

9. The rejection is adequately set forth on pages 10-11 of an Office Action mailed on February 23, 2011 and is incorporated here by reference.

**10. Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Li et al** (US 5,760,097) in view of **Hird et al** (US 2005/0091450), **Ko et al** (US 2003/0134918) as evidenced by **Cawiezel et al** (US 5,633,220) and **Mork et al** (US 6,303,834).

11. The rejection is adequately set forth on pages 11-12 of an Office Action mailed on February 23, 2011 and is incorporated here by reference.

***Response to Arguments***

12. Applicant's arguments filed on August 23, 2011 have been fully considered.

13. Regarding the rejections of claims 6, 8, 13-18 under 35 U.S.C. 103(a) as being unpatentable over **Li et al** (US 5,760,097), claims 6, 8, 11-18 under 35 U.S.C. 103(a) as being unpatentable over **Li et al** (US 5,760,097) in view of **Hird et al** (US 2005/0091450), **Ko et al** (US 2003/0134918) as evidenced by **Cawiezel et al** (US 5,633,220), claims 14-15 under 35 U.S.C. 103(a) as being unpatentable over **Li et al** (US 5,760,097) in view of **Hird et al** (US 2005/0091450), **Ko et al** (US 2003/0134918) and **Sasabe et al** (US 2003/0036575), as evidenced by **Cawiezel et al** (US 5,633,220) and **Lenntech/deionized water** flyer, and claim 11 under 35 U.S.C. 103(a) as being unpatentable over **Li et al** (US 5,760,097) in view of **Hird et al** (US 2005/0091450), **Ko et al** (US 2003/0134918) as evidenced by **Cawiezel et al** (US 5,633,220) and **Mork et al** (US 6,303,834), Applicant argues that:

a) **Li et al** discloses that the density of microbeads being less than 0.04 gm/ml or between 0.06 and 0.07 g/ml; but fails to teach or suggest "a density of at least equal to 6 mg/cm<sup>3</sup> and at most equal to 20 mg/cm<sup>3</sup>";

b) **Li et al** fails to specify ethylbenzene as part of the organic phase; **Li et al** discloses dodecane, toluene, cyclohexanol, n-heptane, isooctane, and petroleum ether; Examples of **Li et al** use dodecane;

c) claim 6 recites the volume of aqueous phase representing at least 96% of the total volume of the two phase; instead **Li et al** recites the volume of water being 70-95% (Table 1 of **Li et al**).

d) **Hird et al**, **Ko et al**, **Cawiezel et al**, **Sasabe et al** and **Mork et al** fail to cure the deficiencies of **Li et al**;

e) the solid polymer foams prepared according to the claimed invention show unexpected results of providing polyHIPE foams from crosslinked hydrocarbon polymer based on styrenic monomers which exhibits density equal to 20 mg/cm<sup>3</sup> and cells with a mean diameter of at most equal to 20 microns.

14. Examiner disagrees.

**Li et al** discloses a process for preparing porous crosslinked styrene-divinylbenzene (col. 2, lines 56-58) microbeads joined by interconnecting pores comprising:

i) combining an oil phase with an aqueous discontinuous phase to form an a high internal phase emulsion (HIPE);

ii) polymerizing the emulsion droplets to form microbeads (Abstract);

iii) washing the microbeads (col. 9, lines 1-5);

iv) drying the microbeads in any conventional manner (col. 9, lines 5-10),

wherein:

a) the microbeads have a density of less than 0.04 g/ml (less than 40 mg/ml) and cavity size of 5-10 microns (Table 2);

b) the oil phase comprises 15-50% of styrene; 15-50% of divinylbenzene; 4-50% of sorbitan monooleate (col. 6, lines 14-18) and a toluene as porogen and solvent for the monomers (col. 6, lines 32-45);

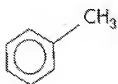
c) the aqueous phase comprises 0.5-2%wt of sodium persulfate and suspending agent in distilled water (col. 6, lines 50-60; col. 7, lines 1-10; col. 20, lines 21-22);

d) the percentage of aqueous phase is 70-98%wt (col. 5, lines 43-44).

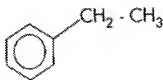
Thus, **Li et al** explicitly teaches the low density styrene-DVB foam having pore size of as low as 5-10 microns and produced by the HIPE process, identical to that claimed in the instant invention.

Though **Li et al** does not explicitly recite the density being 20 mg/ml, however, since the process for producing microbeads of **Li et al** is identical to that claimed in the instant invention, and in Table 2 of **Li et al** the density is specified as being less than 0.04 g/ml, i.e. less than 40 mg/ml, therefore, it would have been obvious to a one of ordinary skill in the art that the density of microbeads of **Li et al** will intrinsically be as low as 20 mg/ml or less, as claimed in the instant invention.

Though **Li et al** does not explicitly recite the use of ethylbenzene solvent, but shows the use of toluene solvent, however, since toluene and ethylbenzene are structural derivatives of each other, having the formulas shown below:



Toluene



Ethylbenzene

and are both used as solvents, therefore, it would have been obvious to a one of ordinary skill in the art to use ethylbenzene as the solvent in HIPE of **Li et al** as well since it would have been obvious to substitute one equivalent for another.

Furthermore, it is known in the art that ethylbenzene is used as a solvent in internal phase water in oil emulsions (see col. 5, lines 60-65 in **Cawiezel et al**). Case law holds that the selection of a known material based on its suitability for its intended use supports prima facie obviousness. *Sinclair & Carroll Co vs. Interchemical Corp.*, 325 US 327, 65 USPQ 297 (1045). Case law holds that the mere substitution of an equivalent (something equal in value or meaning, as taught by analogous prior art) is not an act of invention; where equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See *In re Ruff* 118 USPQ 343 (CCPA 1958).

Though in Examples of **Li et al**, the use of dodecane is shown, however, this does not negate a finding of obviousness under 35 USC 103 since a preferred embodiment such as an example is not controlling. Rather, all disclosures "including unpreferred embodiments" must be considered. In *re Lamberti* 192 USPQ 278, 280 (CCPA 1976) citing *In re Mills* 176 USPQ 196 (CCPA 1972).

Regarding Applicant's argument of unexpected results of the instant invention, it is noted that the process of **Li et al** is a HIPE process for producing low density styrene-divinylbenzene copolymer microbeads, also having low density and low cell size identical to those claimed in the instant invention.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IRINA KRYLOVA whose telephone number is (571)270-7349. The examiner can normally be reached on Monday-Friday 8:00am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasudevan Jagannathan can be reached on (571)272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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